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DOI:

[10.1111/tran.12169](https://doi.org/10.1111/tran.12169)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Akhter, M. (2017). Desiring the data state in the Indus Basin. *Transactions of the institute of british geographers*, 42(3), 377-389. <https://doi.org/10.1111/tran.12169>

Citing this paper

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Introduction

The Indus Basin in South Asia is one of the most intensely engineered watersheds in the world. For over a century state authorities have attempted to transform the river, and its users, into a smoothly operating irrigated agricultural machine (Akhter 2015a, 2015b; Gilmartin 2015; Haines 2014; Wescoat et al. 2000; Michel 1967). Time and again, however, these schemes have fallen flat. Instead of rationalizing and maximizing the productivity of Indus waters, local water managers seem to be perennially mired in controversy around the regional distribution of water resources. To the chagrin of generations of experts and engineers of the central Pakistani state, water governance has been impervious to repeated attempts at rationalization and depoliticization and seems, instead, always prone to politicization. Centralized expert authorities often identify the cause of this perennial repoliticization as the insufficiently modernized (and rationalized) world-view and attitudes of local water managers. But this explanation is itself part of the teleological ideology of state developmentalism. It fails to account for the role played by water experts and engineers as spatially situated political agents navigating the larger socio-historical processes of state formation and uneven regional development.

This paper analyzes attempts by water engineers and administrators, or “hydrocrats” (Molle et al. 2009), to invoke external experts and/or automated measuring technologies as agents of depoliticization in their efforts to resolve water distribution controversies in the Indus Basin. The hope of hydrocrats is that depoliticized and rational agents (external experts and automated measurement) will transcend the perceived over-politicization of local actors. But this depoliticization strategy does not account for the larger context of state formation. Patrick Carroll’s (2012, 2006) analyzes state formation in 17th century Ireland and 19th century

California to conceptualize the “data state” as a state that sublimates all political issues into problems conducive to calculative modes of governance. Drawing on Carroll, I analyze strategies for depoliticization as a technocratic desire for the establishment of a data state in the Indus Basin. Although this paper analyzes water policy controversies, the primary objective is not to generate or evaluate policy. Instead, the goal is conceptual development in the areas of critical resources geography and the political ecology of state formation through the analysis of particular historical-geographical conjunctures. Specifically, I examine how attempts to impose depoliticized water measurement procedures and technologies have been interrupted by the politicizing pressures of state formation at two scales since the middle of the 20th century: inter-state (Pakistan and India) and intra-state (Punjab and Sindh within Pakistan).

In depoliticized modes of environmental governance, ideological and political contests are suppressed by promoting the notion that objectively optimal technological resolutions to environmental controversies exist and can be implemented (Swyngedouw 2009). Engineers often act as agents of depoliticization by abstracting natural resources from historical and geographical context and re-presenting them as quantitative measurements (Mitchell 2002; Robbins 2000; Scott 1998; Ferguson 1996). This general relation between expert authority, quantified representation, and *depoliticization* is a well-worn theme in the critical resources and development literature. A growing body of scholarship tracks how expert-led depoliticization invokes and interacts with processes of *repoliticization* (Anderson et al. 2016; Swyngedouw and Williams 2016; Beveridge et al. 2014; Bakker 2013; Loftus 2006). This paper contributes to this literature by developing a theory of state/resource interaction that posits engineers as agents of depoliticization that encounter distinct types of repoliticization at different scales.

Attention to scalar difference is a key methodological principle undergirding my analysis, as indeed it is for many water geographers (Akhter 2015a, 2015b; Swyngedouw 2015; Harris and Alatout 2010; Mustafa 2007). Geographers have examined the spatiality of water expertise, the shifting sites of authoritative knowledge production, and the role of regional political economy, in several contexts, including stream restoration (Lave 2015), the representation of watersheds and rivers (Hwang 2015; Swyngedouw 2015; Cohen and Bakker 2014; Sneddon and Fox 2012; Harris and Alatout 2010), and the global circulation of irrigation expertise (Akhter and Ormerod 2015). This paper takes a different route by comparing and connecting technocratic strategies of depoliticization at two distinct but related scales. The paper thus contributes a scale-sensitive theory of repoliticization to the scholarly interrogation of the historical and ongoing imbrications of state formation, expert authority, and water resources (Sneddon 2015; Moore 2013; Harris and Alatout 2010). In particular, the arguments in this paper speak to research that examines how processes of state formation enroll natural resources into the consolidation of territory (Perramond 2016; Wainwright and Robertson 2003) and articulate a modernizing nationalist ideology (Akhter 2015a, 2015b; Menga 2015; Swyngedouw 2015; Camprubi 2014; Klingensmith 2007; Kaika 2006).

In what follows, I theorize water measurement conflicts in the Indus Basin at the inter-state and intra-state scales through an analysis of negotiation drafts and memos relating to the Indus Waters Treaty of 1960, government reports, media coverage, and semi-structured interviews with 22 senior engineers and water bureaucrats (conducted in Punjab, Pakistan in 2010 and 2012). The section on inter-state processes of depoliticization and repoliticization focuses on Indus-

related border conflict between Pakistan and India in the decade after independence in 1947. The analysis of intra-state water conflict examines the contested politics of articulating a hegemonic nationalist ideology with respect to quantifying water resources. Comparing the politics of water expertise across grounded conjunctures highlights how processes of depoliticization are differentiated by scalar context. In the context of inter-state politics, the aspect of territory assumes greater importance. In the context of intra-state politics, on the other hand, the aspect of nationalism assumes greater visibility. This difference arises because hydrocrats and state elites encounter a different configuration of the political terrain at the inter-state and intra-state scales. Before turning to the substantive analysis, I first review the relevant literature on the state in critical resources geography.

Theoretical context

This section has two parts. First I situate the analysis of resource expertise in the process of state formation, paying special attention to how geographers and others have examined the interaction between technocratic strategy, territorial imperatives, and nationalist ideology. Next I draw on science and technology studies, state theory, and political ecology to develop a theoretical framework to analyze the technocratic depoliticization of water resources governance in the context of state formation.

The state in critical resources geography

Critical resources geographers have argued that non-human substances come to be signified and exploited natural resources through a historical, political, and economic process (Bridge 2014; Bakker and Bridge 2006). State power plays a large role in the discursive and material

transformation of nature into an economic resource as well as into a symbol of the nation (Whitehead et al. 2007; Scott 1998). Credentialed experts, or technocrats, play an especially prominent role in the enrollment of nature into political and geographical state water projects (Carroll 2012, 2006; Mitchell 2002). The technocratic authority over water (including the legitimacy to produce and control representations of water) and political authority over populations and territory are intimately connected. Geographers have theorized this connection between water expertise and state formation in Spain (Swyngedouw 2015; Camprubi 2014), the US West (Akhter and Ormerod 2015; Carroll 2012) West Asia (Harris and Alatout 2010; Alatout 2009; Mitchell 2002), East and Southeast Asia (Sneddon 2015; Moore 2013), and the Indus Basin in South Asia, which is the geographic focus of the present paper (Akhter 2015a, 2015b; Gilmartin 2015; Haines 2014, 2013; Mustafa 2013, 2002, 2001; Ali 1998; Aloys 1967). A powerful theme that cuts across these diverse historical-geographical contexts is the role of state experts as agents of depoliticization.

“Depoliticization” refers to the framing of ideologically contested issues as administrative or technical problems (Mitchell 2002; Ferguson 1990). Experts, and especially engineers, have historically been at the forefront of attempts to depoliticize water governance. One of the main de-politicizing strategies deployed by engineers is to address complex environmental problems by insisting on the need to generate more data. Indeed, many in the engineering profession share a conviction that the best way to govern water is through quantification and expert decision-making (Molle et al. 2009). The quantitative measurement of resources is an example *par excellence* of what James C. Scott (1998) calls the state-led “simplification” of the world. Scott argued that the “high modernist” state is engaged in an epistemological project to reduce

(“simplify”) the inherent complexity of landscapes and social formations to a quantifiable dimension. But while the state’s ambition is to simplify, water engineers and bureaucrats are very aware that it is often impossible to fully “know” water systems through quantitative (and cartographic) measures, and that this unknowability decisively shapes the everyday politics of water management (Anand 2015; Muehlmann 2012; Coelho 2006). Political ecologists and resource geographers have highlighted the incredible complexity of the world itself as an obstacle to simplification and depoliticization (Robbins 2000; Scott 1998). But there are other sources of repoliticization. This paper responds to the call to situate the dialectic of depoliticization and repoliticization in the political geographic processes of state formation (Wang 2007).

Technocracy and state formation: Towards a multi-scalar theoretical framework

Two main points underlie my theoretical approach to the analysis of technocracy and state formation. The first is that technoscientific expertise, especially when located institutionally in the state, is crucial to state formation. Patrick Carroll (2012, 2006) has identified the impulse to sublimate problems of governance, especially water governance, into a quantifiable engineering problem as a defining characteristic of the modern state. This approach to governance dominates in what Carroll terms “data states” – states in which any range of political issues are sublimated into quantified problems that are resolvable by the application of technical expertise. Carroll’s provocative framework analyzes how experts and technological objects shaped state formation through analysis of 17th century Ireland and 19th century California. But Carroll’s analysis of the role of experts in colonization suggests that the data state is an inevitable accomplishment in these places. The data state, as a category to understand the role of expert-led depoliticization in

the process of state formation, is deployed in this paper as a way to capture the strategic goals of high-ranking members of the hydrocracy in the Indus Basin. Instead of assuming the establishment of a data state, I attend only to the powerful *desire* for the data state.

Molle et al. (2009) argue that a unified “hydraulic mission” – defined by a rational, complete, and quantified control over water – is shared by many of the world’s national hydrocracies. But they do not stress the dialectic of depoliticization and repoliticization in the operations of hydrocracies. And although they are at pains to sufficiently highlight the diffusion of the hydraulic mission around the world, more focused theorization of the complex spatiality of technocrat-led depoliticization is still needed – especially in terms of the politics of scale (Akhter 2015a, 2015b; Swyngedouw 2015; Harris and Alatout 2010). The dynamic of depoliticization and repoliticization acts in differentiated but connected ways across scales because of the differing balance of political forces at these scales. This point, regarding the importance of scalar context in processes of technocrat-led depoliticization and state formation, is explored in greater detail in the next section through an analysis of water distribution conflicts at the inter-state and intra-state scales.

Understanding technocracy and state formation requires a geographically nuanced understanding of “the state”. As a way of synthesizing the insights of post-structural state theory into science studies, Carroll (2006) argues “the state” as a category should be analytically disaggregated to distinguish distinct but overlapping aspects of state power. There are three major senses in which “the state” is invoked in social scientific analysis: the state as a system (bureaucracy), as an idea (nation), and as a country (territory). In Carroll’s materialist analysis, technological objects

mediate and suture together these three aspects of state formation. Thus, in Ireland and in California, Carroll argues that science, in the form of objects like meters that “read” the landscape, was crucial to the establishment of modern statehood. The role of science and technology is to enable the representation of territory (or the non-human more broadly) in such a way that state technocrats can consolidate their authority in the name of a depoliticized ideology of the nation, or the data state. The analysis that follows benefits from Carroll’s disaggregated approach to state formation, as it allows a useful distinction between the technocracy’s engagements with territorialization on the one hand and with nationalist ideology on the other. More importantly, Carroll acknowledges that even though distinctions are analytically useful and necessary, the individual aspects of state formation are nevertheless inextricably tied together as part of a larger historical and geographical process.

The following two sections examine the technocrat led depoliticization of water distribution conflicts at two related scales in the Indus Basin: the inter-state scale conflict between Pakistan and India, and the intra-state scale conflict between the Pakistani provinces of Punjab and Sindh. These cases are similar in the way technocrats pursue the data state at both scales, especially in their invocation of external expertise as the final adjudicator. But they also effectively demonstrate how processes of repoliticization are differentiated by scale, with the politics of territory dominating at the inter-state scale and the politics of nationalist ideology dominating at the intra-state scale.

Inter-state water conflict: Hydrocracy and the politics of territory

In 1947, the region of Punjab was split between the new states of Pakistan and India as a part of the partition of British India. This bisection of Punjab also divided the vast irrigation system on

the tributaries of the Indus, built by the British Indian state to be operated in an integrated fashion. Sir Cyril Radcliffe, the British bureaucrat tasked with demarcating the border between Pakistan and India, wrote about his experience. He “was deeply impressed – as anyone concerned would be – by the great importance of not allowing the physical division of territory to sterilize the workings of an interrelated irrigation system” (quoted in Michel 1967, p. 164; see also Chester 2008). Radcliffe tried, but failed, to work out some system of binational co-management of the basin. The route of the border splitting was finally announced on August 17, 1947 – although there remained some questions marks, particularly in the area of Punjab where the Sutlej tributary entered Pakistan from India (Chester 2008). The important agrarian region of Punjab in Pakistan was downstream and vulnerable to the actions of a hostile upstream neighbor – a fact not lost on Pakistani politicians and farmers. The situation was especially tense in light of two facts. First, that millions on both sides of the border had been displaced and killed during the process of partition, embittering Pakistanis and Indians alike. And second, that the status of the region of Kashmir was in dispute, and indeed had already caused a Pakistan and India to go to war (not for the last time) in 1947-1948.

This volatile situation alarmed the international community. In 1951 David Lilienthal, of Tennessee Valley Authority fame, penned an article in *Collier's* entitled “Another Korea in the Making?” Lilienthal argued that the water conflict between India and Pakistan “was not a religious or political problem, but a feasible engineering and business problem for which there is plenty of precedent and relevant experience” (Lilienthal 1951, p. 58). He suggested the involvement of an institution with expertise at its disposal, like the World Bank (or the Bank), to mediate the dispute on purely “technical” grounds. Thus from the beginning of the international

dispute, hydrocrats explicitly called for the depoliticization of the issue by framing the problem as one of a lack of engineering expertise (Akhter 2015a). Eugene Black, president of the Bank, agreed with Lilienthal. So did state officials from Pakistan and India. Engineers and diplomats from Pakistan and India began negotiations in 1952 with the World Bank acting as mediator.

For Indian and Pakistani officials the involvement of the newly-minted World Bank also offered the possibility of depoliticizing the conflict. The Bank's involvement was valued not because it had greater relative depth of expertise in river control issues. Indeed, Bank officers themselves acknowledged that "the proficiency of the Indian and Pakistani engineers in canal irrigation techniques is unsurpassed, and perhaps unequalled, anywhere in the world" and that it was "doubtful whether such complete recorded flow data as exists for the Indus system of rivers and canals could be duplicated for any comparable river system in any other country" (World Bank 1954). Rather, Pakistani and Indian state elites valued the Bank's involvement because it was an *external* source of expertise – external to the nationalistic loyalties and prejudices that seemed to make the Indus dispute such a bitter one. Ultimately the Bank was unable to completely depoliticize the Indus dispute, and the final form of the Indus Waters Treaty represented a political negotiation, not a technical optimization of the basin's resources (Haines 2014; Michel 1967). This was because the repoliticization of the conflict at the inter-state scale was not rooted only in the nationalistic attitudes of postcolonial state elites. It was also firmly rooted in the territorial imperatives of state formation.

At the start of the negotiations, however, Bank officials and engineers eagerly performed the role of vectors of depoliticization by stressing the need for an engineer's approach to the problem.

The very first meeting of the negotiations was on May 17, 1952, in Washington, D.C. At “the Engineers’ Meeting” as it was referred to by participants, Pakistani, Indian and Bank engineers were tasked with completing a plan for integrated basin development. General Raymond Wheeler, the leading technical Bank representative, pressed all participants to proceed with the negotiation on a “functional, not political, plane” (Wheeler 1952, January 11). However, as the controversies regarding water metering and distribution ramped up during the 1950s, depoliticization via quantification and the invocation of external expert authority was not always successful. Given the political imperatives of state formation, especially territorialization via demarcating and securing clear borders, attempts to depoliticize inter-state Indus conflict were (and still are) prone to repoliticization.

During the winter of 1952-1953, the Pakistani press reported that India was withholding waters on transboundary canals before they entered Pakistani territory, and was therefore violating its commitment to maintain “status quo” delivery of flows to Pakistan (Black 1953, February 6). The Pakistani government followed up these reports with a formal request to the World Bank to “intervene” and “investigate” the supposed diminution of Indus water supplies. General Wheeler reluctantly made inquiries into the matter, visited the area in Pakistan allegedly suffering diminished water supplies, and suffered the “heated discussion” of the Pakistani and Indian engineer-designees over the matter. By the end of January 1953, Wheeler reported that the Pakistanis were no longer interested in establishing Indian wrong-doing – instead they insisted on an official procedure for the exchange and verification of water flow data (Black 1953, January 23).

On February 9, 1953, Pakistan proposed that a procedure for sharing and verifying flows on the Sutlej River (a major transboundary tributary of the Indus) be established. A letter from Prime Minister Khwaja Nazimuddin of Pakistan reacted to a vaguely proposed Bank plan to implement a program for the efficient “collection and on the spot verification of current flow and discharge data on the rivers of the Indus system”. Nazimuddin suggested that any “verification” procedure should consist of a commission consisting of “a representative engineer each of Pakistan and India, and another of the World Bank” that would “from time to time” “inspect station logs and check gauge and discharge readings (Nazimuddin 1953, February 9). Nazimuddin’s suggestion that there should be “on-the-spot” verification of station logs and gauge and discharge readings catalyzed territorial anxieties from Indian state officials. Rather than accepting the involvement of engineers as vectors of depoliticization, Indian and Bank officials worried that the act of a state engineer crossing a border to measure water flows would be read as an act of state territorialization.

On February 16, Eugene Black told a Pakistani delegate in London that he thought setting up a verification committee would “prove offensive to India” and the idea should probably be dropped (Somers 1953, April 8). Indeed, during a meeting in Baghdad on March 9, B.K. Nehru, a prominent Indian statesman and diplomat, told Black point blank that any such plan for verification of Indian gauges and logs by Pakistanis would be impracticable, and would “require an Army” to implement (ibid). B.K. Nehru pressured the Bank to get moving on the negotiations by threatening that India would begin drawing water from the disputed Beaj-Sutlej rivers by April 1954, and “that if there is no agreement by then, trouble will start” (ibid). Nehru went on to argue that “if information regarding current flow data is conveyed to Pakistan, it might be used

by Pakistan against India” (ibid). In the weeks that followed, B.K. Nehru would go on to insist to Bank officials it “was a question of national sovereignty” and that the “dispute is not about gauge readings or the facts. It is about the interpretation of what is really the status quo...” (Somers 1953, April 18).

In early April of 1953, Jawaharlal Nehru, the charismatic Indian Prime Minister, personally entered the fray by writing a letter to Nazimuddin. J. Nehru urged Nazimuddin to approach him with any future doubts about the quality of data that India was providing, as he was “taking [a] personal interest in this question” (Nehru 1953, April 6). J. Nehru warned he “would not welcome any Inspectors or others of the World Bank to interfere with this matter” as this would be “unbecoming for an independent nation” (ibid). But Pakistani officials remained insistent. One Pakistani officer based in the embassy in Washington D.C. repeated the proposal to depoliticize the issue by including an engineer appointed by the World Bank, who ostensibly would be above the politics of Indo-Pak rivalry and territorial sensitivity. The embassy officer argued that “the presence of a Bank engineer participating in the collection and verification of flow and discharge data would help restore” confidence on both sides of the border that the issue was being handled in a judicious manner (Shafqat 1953, April 29). The implication was that a Bank engineer would be above the pettiness of the Indo-Pakistan rivalry. The Bank’s response to Pakistan’s suggestion was, again, not encouraging. On May 8, 1953, Iliff responded directly to the Pakistani official’s April 29 letter: “...in [the] present circumstances, it would serve no useful purpose to pursue the matter of establishing a procedure for verification of current data...” (Iliff 1953, May 8). It seemed Pakistani delegates had to let go of the idea of having either Pakistani or Bank engineers participate in the data verification on Indian territory.

The Pakistani government appointed an “Irrigation Commissioner” to handle all matters relating to insufficient flows and the verification of data. The correspondence between the two water commissioners, Garg from India and Ghafoor from Pakistan, between the years 1953 and 1954, sheds further light on the politicized nature of water data sharing and verification. During a meeting on August 29, 1953, Garg and Ghafoor formally agreed that there should be system of joint verification of water data measurements. But the territorial implications of state engineers crossing borders to take water flow measurements continued to haunt the negotiations. At this stage the imperatives of territorial consolidation repoliticized the water flow verification controversy. The involvement of Pakistani and Indian militaries and border guards shattered the fantasy of depoliticizing engineers collecting data in the service of an efficiently operating irrigation system.

Ghafoor touched on the militarization of the data generation and verification schemes in his report to the Minister of Industries of his meeting with Garg. He reported that the Indian team had requested that they “should be allowed to take their own armed escort” into “Pakistani territory” to a demand that ultimately “was not acceptable to Pakistan’s Border Police Commandant” (Ghafoor 1953, September 7). Garg, on the Indian side, sent a similar report concerning the August 29 meeting with Ghafoor to the Indian Minister of Irrigation and Power. The Indian military, Garg reports, “naturally did not agree” to have a Pakistani armed escort for Indian engineers on the right bank of Depalpur canal, which in the Indian view was “in unauthorized possession of the Pakistani military” (Garg 1953, October 5/6). The suggestion of replacing the figure of the Bank engineer, ostensibly apolitical and above the fray, with the

figure of the armed escort, literally wearing a uniform of a militarized state, represents the overt politicization of the issue.

Although the Commissioners had agreed in principle that discharges should be measured and verified jointly by Pakistani and Indian engineers, the contentious politics of territorial control did not allow this to happen in practice. Garg highlights his powerlessness as a mere engineer in this inescapably political dispute in a letter to the Irrigation and Power Minister. “The question has arisen” he writes, of “military authorities of which country should provide escort to the Discharge Observation Party.” He goes on to lament that “Pakistani military do not allow Indian military to escort out party on the left bank, which the latter do not allow Pakistani military authorities to escort our party in this reach” and ultimately that “both the Commissioners are helpless in this matter (Garg 1953, October 21).

Yet Pakistani officials continued to insist that India was withdrawing more water than its due – something it could not conclusively prove because it did not have enough data. In a heated complaint to the World Bank dated December 7, 1953, a Pakistani delegate laid out the case from the Pakistani perspective: “Mr. Garg in effect says that Pakistan cannot claim shortages because it does not know all of the facts; and, Pakistan does not know all of the facts because India will not disclose them,” ([Pakistani Negotiator] 1953, December 7). The situation remained in stalemate. On October 11, 1953, Indian engineers attempted to take measurements on a small portion of the Sutlej River that was upstream of India yet in Pakistani territory. The Indian engineers arrived at the border with Indian soldiers providing armed escort. But the Pakistani

soldiers posted at the border did not let the engineers proceed, and the engineers had to retreat (Nehru 1953, December 16).

The politics of territory played a powerful role in depoliticization strategies at the inter-state scale. The question of verifying water flows into Pakistani territory remained a source of constant irritation and tension throughout the negotiations. Although all issues of border demarcation in the Punjab were finally settled in 1960 (Chester 2008), the question of Kashmiri territory remains disputed even today. While the disputed region of Kashmir is too complex to delve into here, it is important to note its connection to the geography of the Indus system. As two major tributaries of the Indus (the Jhelum and the Chenab) flow through Kashmir for significant reaches before entering Pakistan, control of Kashmir effectively bestowed strategic control of Pakistani headwaters as well. This fact of downstream vulnerability still haunts state elites and others in Pakistan, despite the fact that one of the explicit intentions of the Indus Waters Treaty of 1960 was to severely restrict Indian uses of waters from the Jhelum and Chenab. Pakistani officials have invoked international arbitration under the terms of the Indus Waters Treaty twice since 2005, both times over Indian river infrastructure projects in Kashmir. While legal and engineering experts did deliver binding decision for both cases, the highly politicized nature of the conflict did not escape the attention of observers (Akhter 2013).

At the inter-state scale of conflict, then, the source of repoliticization was the territorial aspects of state formation. Initially, it was thought that the act of water measurement by external experts would be sufficient to depoliticize the conflict between Pakistan and India. However the need by both Pakistani and Indian state officials to secure boundaries and to assert exclusive control over

parcels of territory served enough to repoliticize the question of water measurement. Following Carroll (2006), this case suggests that the meter is a technological object that can serve to bind the bureaucratic state-apparatus with the territorial state-country. It follows that a mundane and seemingly apolitical activity like measurement, even when backed by external expertise, can become politicized by the processes of distribution *and* state formation. The next section examines depoliticization in the context of intra-state water controversy. Specifically, it analyzes the role of water measurement technology in long-running disputes between upstream Punjab and downstream Sindh in Pakistan.

Intra-state water politics: Hydrocracy and the politics of nationalism

The main axis of water conflict in the intra-state context is between the dominant province of Punjab, which is relatively upstream, and the three other provinces, especially the downstream province of Sindh. Central to the political development of the Pakistani state is the tension between Punjab, which largely controls the central state apparatus and the other provinces. Thus, intra-state water politics shapes, and is also shaped by, the history of water development and distribution in the Indus Basin (Akhter 2015 a, 2015b; Gilmartin 2015; Mustafa 2007). Although a formula for allocating water between the provinces was established in 1991, politicians and administrators from Punjab and Sindh routinely accuse each other of manipulating water flow data. This section addresses the debate surrounding the installation and operation of telemetry – automated metering from a distance – along Pakistan’s vast inter-provincial water distribution network. I do not discuss the technical or policy details of telemetry in this paper, nor do I “weigh in” on the use of telemetry as a policy prescription or evaluate the veracity of interviewee statements about telemetry. Instead, I am interested in the ways telemetric technology comes to

be valued by technocrats because it displaces decision-making power from local water managers and users. Telemetry represents the authority of external expertise, but in a different way than the Bank engineer represented external authority in (as described in the previous section). Telemetry is “external” expertise not in an absolute spatial sense, but in the sense of being understood as separate and above the political landscape.

Upstream/downstream conflict between Punjab and Sindh existed even before the independence of Pakistan. Tensions arose in the early decades of the 20th century, as the British began to develop various reaches of the basin (Michel 1967). Over the decades, first the British and then the Pakistani state appointed numerous committees of legal and engineering experts to allocate the waters of the Indus, including the Anderson Committee (1930), the Indus Commission (1942), the Akhtar Hussain Committee (1968), the Fazle Akbar Commission (1970), the Anwar-ul-Haq Commission (1981) and the Haleem Commission (1983) (Akhter 2015b; Haines 2013; Mustafa et al. 2013; Michel 1967). All these commissions did not settle upon a widely accepted formula to allocate waters of the Indus. Finally, in 1991, the Indus Water Accord was ratified by the federating provinces of Pakistan.

The Indus Water Accord establishes the Indus River System Authority, which is tasked with overseeing the distribution and monitoring of Indus flows between the provinces. The 1991 Water Accord codified a formula for the allocation of Indus waters between the provinces of Pakistan. The provinces of Punjab and Sindh were allocated about 49 percent and 43 percent, respectively, of the total allocated amount of 114 million acre-feet. Despite a clear formula, however, controversy arises frequently in Pakistan over inter-provincial allocations and

allegations of corruption and data manipulation flow back and forth between the provinces of Punjab and Sindh.

Just as with inter-state geopolitical tension around water, controversy at the intra-state scale revolves around the verification of water flow measurements. The hydrocracy deploys parallel strategies of depoliticization at both scales by situating the capacity to produce unbiased data in either external expertise or in expert-displacing technology. One means of attempted depoliticization through automated measurement involves telemetry, or remote measurement. Telemetry relies on a distributed and automated network of water meters that reports data to a central location. International and domestic policy experts often suggest telemetry as a method to take the politics out of Indus water sharing agreements (e.g.; Briscoe and Qamar 1996). By taking measurement out of the hands of humans, telemetry is supposed to depoliticize water allocation between states, provinces, and farmers (von Schnitzel 2012). Telemetry was introduced in the irrigation sector in Pakistan in the late 1980s with the help of international development organizations to minimize the disjuncture between the local measurements and central management of the water supply. Telemetry instrumentation and data collection has also been in use, on a demonstration trial basis, on the Nara canal in Sindh since 2004. More recently, in 2010, a similar system was agreed upon in principle between Pakistan and India (Shafique 2010). Telemetry remains a popular proposed solution to the politics of water distribution, despite the fact that it has not been effective in resolving political tensions in the past. In what follows I explore how engineers in Punjab with strong connections to the central water bureaucracy understand the ways that the technology becomes repoliticized in the intra-state context. As this group includes those some of the strongest proponents of telemetry, an analysis

of their attitudes and values can help construct a portrait of the desire for the data state in the country.

I interviewed senior hydrocrats in Lahore and Islamabad, Pakistan, in 2010 and 2012. Mr. Majeed (I use pseudonyms for all interviewees) was a particularly thoughtful respondent, as a senior engineer with almost forty years of experience in the irrigation sector. Eight of these years had consisted of service at the federal level dealing with issues of inter-provincial allocations. I asked Mr. Majeed why telemetry had failed to depoliticize water distribution within Pakistan. For him, the issue seemed to boil down to the inevitable fallibility of a system that allowed humans to exercise judgment at some point.

WAPDA installed the system at a cost of 400 million [Pakistani Rupees], and we [IRSA] took it over for four or five months. There were too many problems, so we just handed it back. The system is of practically no use. This is because some gauging stations [for the measurement of flows] are with [located inside] Punjab, like Marala, Rasul, and Qadir, others are with WAPDA, like Mangla, Tarbela, and Kabul, and still others with Sindh, like Kotri and Guddu. The telemetry system was not entirely automatic – the system measures the water level, and then the volume and flow are derived from this by use of a formula. The choice of coefficients for this formula is subjective.

Mr. Majeed implies that the provincial identity of the engineers corrupts telemetry data. Instead of having one centralized, remote, authority generating numbers, there are Sindhis, Punjabis and federal government employees squaring off against each other. Amir Qasim, a former Chief

Secretary for Water who now works for a large private engineering consulting company, held similar views on the geography of telemetric data production. Mr. Qasim told me he had broached the idea of installing telemetry in a federal cabinet meeting as a way to assure Sindhis that Punjabis were not stealing “their” water. “And Sindhis have this fear” he told me, “despite the fact that there is a Sindhi observer sitting on every canal in Punjab. But these water issues are just being politicized.” For Mr. Majeed, in contrast with Mr. Qasim, the fault is less with the provincial identities here than with the lack of full automation of the telemetry system.

Author: If we were to install the very latest and best telemetry technology, do you think it would work then?

SM: Well, even now, the *system* is fine, but the management of it is not fine. For example, did you know that the British left operations manuals in which they had three levels of measurements? For a first class measurement, the margin of error would be limited to 3%, and it would be done by the [engineer in charge] every three months...so you can have specific guidelines, but if they are not enforced and the people are not professional you won't have the result.

Mr. Majeed fixates on a certain type of corrupted human involvement to explain what he considers the undue politicization of water flow data. He also fondly recalled the superior efficiency and competency of British governance. The implication is that the water manager in Pakistan that is working on the operational level – making measurements, interacting with farmers – is insufficiently modernized and professionalized with respect to the efficient

management of resources. This understanding of overly-politicized water managers at the local or operational level is typical amongst high-ranking Punjabi engineers (Mustafa 2013, 2002, 2001). Indeed, the trend of water policy reform in Pakistan since the 1980s has been towards moving decision making power away from the local water bureaucracy (Mustafa 2013; Westcoat et al. 2000). A 1994 World Bank report that provided an overview of irrigation management in Pakistan and the subsequent Pakistan Irrigation and Drainage Act of 1997 are two key documents that embody the policy perception of an overly politicized local water bureaucracy. While this approach to water reform was part of larger international shift in policy thinking about irrigation (Westcoat et al. 2000; Mollinga and Bolding 1994), the notion that water managers operating at the local level are overly politicized has a long history in the Indus Basin (cf. Gilmartin 2015). The implementation of irrigation bureaucracy reform has not kept up with the policy rhetoric. Nevertheless, it is important to note that politicization in water management is perceived by the technocracy to arise from the insufficient modernization of local water managers.

This sense of the politicization of the local water engineer, and the consequent desire for a depoliticized data state, was also expressed by another of my respondents, Dr. Shafqat, an agricultural scientist who had worked for WAPDA in the past and was keenly involved in debates around water development and distribution in Pakistan. His thoughts on telemetry are interesting because they call for foreign expertise as a means to depoliticize the operations of telemetry. This is ironic, given that telemetry itself was introduced as a means depoliticization.

The telemetry system has been properly installed, but there are still disputes! This is because of the relationship between water level, which is what the telemetry system actually measures, and total water quantity, which is derived differently by everyone. I think what should be done is to call in outside experts to arbitrate inter-provincial allocation for perhaps ten to fifteen years, so that a good pattern is established. After that, IRSA could take over. In this way telemetry could be an excellent confidence-building system.

Dr. Shafqat's solution requires an "outside expert" to establish a pattern of what would be perceived as a "fair" way to allocate water and adjudicate disputes between the provinces. After this period of stability, Dr. Shafqat was counting on institutional inertia and precedent to tide things over. Being an expert, in other words, is not enough – an "outside" expert would be required to ensure that regional loyalties do not obscure or "politicize" what needs to appear a purely technical decision. This proposed technocratic means of depoliticizing the operations of the telemetry seems reasonable if we accept that the primary cause of repoliticization is provincial loyalties and localized political horizons of water managers. But the more powerful structure of repoliticization, as I have been arguing, is more accurately located in the process of state formation. At the intra-state scale, the politics of consolidating a nationalist ideology that can accommodate Pakistan's extreme regional and spatial economic unevenness has always been a fraught and contested process. Struggles on this terrain of articulating a hegemonic narrative of nation and water resources can powerfully repoliticize debates around inter-provincial water distribution. Indeed, for some engineers I spoke to, the call for telemetry was not only about

engineering rationality, efficiency, and utility maximization – it was also about articulating a sort of data nationalism to supplement the pursuit of a data state.

The politics of nationalism decisively shape depoliticization strategy at the intra-state scale.

Engineers must adapt moralistic narratives, and often in a nationalist register, to adapt to specific concrete contexts (Akhter and Ormerod 2015; Swyngedouw 2015; Camprubi 2014; Kaika 2006).

The desire for the data state and depoliticization does not stop at merely offering the most efficient or rational solution – it insists on the necessity of this solution to forestall national moral decline, and for national progress and development more broadly. For example, Mr. Majeed’s desire for telemetry was part of a larger narrative of organizational and cultural decline in Pakistan since the middle of the 1970s. To emphasize how bright prospects in Pakistan had been back then for a young engineer, he proudly told me he had been offered, and rejected, a job offer in the U.S. To reject such an offer in contemporary Pakistan, he implied, was unthinkable. He contrasted the situation “back then” with today, when a moral decline had infected not only all the major Pakistani institutions, but also the very core of Pakistani society: “No one feels there is any national consequence for any of their actions- everything is for sale, honor, integrity, everything.” Mr. Qasim also espoused a narrative of moral decline in Pakistani institutions, although he located the proximate cause in institutional factors. Speaking specifically of WAPDA, which is remembered by some engineers as the vanguard of Pakistan’s Cold War developmental state (cf. Akhter 2015a), he said “Those personnel who do not have to deal with the public have retained some professionalization. In general, the structure of WAPDA is the same, but training of engineers has declined – today they learn only bureaucratic [i.e., uncreative] engineering” (personal interview, April 2012, Lahore).

Suspicion of the professional mindset of the lower level engineers is palpable here – and is tied to a more generalized narrative of national decline. The involvement of lower-level engineers means they are more likely to be entangled with the messiness of local politics – and thus more in need of depoliticization. Skepticism regarding all lower-level engineers, regardless of their provincial identity, also suggests that there is more than Punjabi chauvinism at play in the attitudes of my interviewees – although this is always a factor in Pakistani politics. For example, dissent to the Akhtar Hussain water allocation committee, convened in 1968, was strongly expressed by non-Punjabis in terms of the regional water rights of the other provinces, especially Sindh (Akhter 2015b). Another example is the long-running debate around the construction of Kalabagh Dam, a dam that is favored by Punjab and the central government, but opposed by the other provincial governments. In the province of Sindh anti-Kalabagh sentiment runs particularly high, and plans to build the dam on the main-stem of the Indus are often expressed by intellectuals and politicians in the province as theft by Punjab (e.g.; Paliyo 2003). Bashir Malik, a prominent engineer who has worked at the federal level for many years, offers a typical response to the regionalist opposition to Kalabagh Dam:

“It [Kalabagh Dam] is for the benefit of the whole country and not for any particular province or region. It has been found feasible by the world’s leading experts and approved by the World Bank for financing. Despite the need for its earliest construction, it has been held hostage in a political quagmire...” (Malik 2003, p. 170).

Mr. Malik is here engaged in the ideological struggle to represent the Kalabagh Dam as a national project, not one that disproportionately benefits one province over the other. He also invokes the authority of external expertise as objective and depoliticized. Paradoxically, these contests around nationalist ideology made by Mr. Malik, along with Mr. Qasim and Mr. Majeed, seem to invoke a politicized vision of the nation, on the surface the very opposite of what a depoliticized strategy might do. However, nationalist ideology that accompanies the formation of a data state it is actually what Wang Hui (2006) calls a “depoliticized politics”. This is a technocratic strategy to transcend ideological contestation by invoking a type of state that functions not as an arena for political representation and conflict, but as a techno-managerial environmental administrator.

While engineers at more centralized levels of the state apparatus did initially express the hope that local engineers will overcome their regional and provincial loyalties by virtue of being trained engineers, many I interviewed ultimately accepted that water development and distribution were inherently political, or inherently prone to ideological conflict and antagonism. The technocratic explanation offered for the relentlessly political nature of water distribution was the hopelessly provincialized loyalties and limited political horizons of water managers at the operational level. The depoliticizing strategies of central state hydrocrats, based on this ahistorical understanding of politicization, was to invoke the power of objective data - whether in the form of an external expert or automated technology - to achieve an optimal managerial solution. I argue that a more historically-geographically sensitive way to understand repoliticization in the Indus Basin is to contextualize hydrocratic desire for the data state with respect to the larger process of state formation. In the case of inter-state water conflict, territorial

imperatives of the Pakistani and Indian states politicized and indeed militarized the seemingly mundane and apolitical task of engineers verifying water measurements. In the intra-state case, it is the struggle to formulate a hegemonic nationalist ideology that leads to the politicization of water measurement.

Water distribution contests within Pakistan cannot be understood without greater sensitivity to the core-periphery dynamics that characterize Punjab's relation with the rest of the country. In other words, disputes around water distribution are just one expression of a larger problem of state formation – that of forming a compelling national narrative that can present certain natural resources as national resources (Hwang 2015; Menga 2015; Swyngedouw 2015; Harris and Alatout 2010; Whitehead et al 2007). The generation of data, regardless of whether it is done by external experts or automated technology, does not effectively address the major causes of repoliticization as it claims to. While scientific objectivity is possible in the abstract sense, scientific measurement in concrete situations is inevitably marked by uneven social and spatial power relations. The discussion that follows further elaborates a multi-scalar political geographic theory to understand technocrat-led attempts at resource depoliticization.

The spatiality of depoliticization

The previous sections explored the desire of the Pakistani hydrocracy for a data state, and the strategies of depoliticization that this desire catalyzes, and the subsequent questions regarding objective water measurement. But depoliticization in this area has never been fully successful because of the context of state formation that results in the constant repoliticization of questions of water distribution. Examining the processes of depoliticization and repoliticization at two

distinct but connected scales has brought to the surface the complex spatiality of expertise – especially hydrocratic expertise. In this section, I elaborate on how and why critical resource geography can be enriched by a theoretical framework that is sensitive to the scalar contexts of depoliticization and of the complex spatiality of expert authority more broadly.

Two points regarding the spatiality of expert authority and depoliticization stand out from the analysis of water measurement controversies in the Indus Basin. The first is that while hydrocrats pursue similar strategies of depoliticization at both the inter-state and intra-state contexts (quantification), processes of repoliticization play out differently at these scales. Using Patrick Carroll's (2006) terminology, we can say that state formation involves the historically situated interaction of the bureaucracy (the state-apparatus) with the processes of consolidating territory (the state-country) and the struggle to make particular nationalist ideologies hegemonic (the state-idea). The geographical aspects of state formation were manifest as scale-specific forces of repoliticization. Although the politics of nationalist ideology are inseparable from questions of territorialization, I argue that intra-state water allocation controversies in Pakistan can be understood as struggles to enroll water resources into particular nationalist ideologies. Similarly, at the inter-state scale, what started out as disagreements about water measurements quickly became intensely politicized debates about territorial control and integrity.

One reason for the larger role of territorial concerns at the inter-state level is the type of actors and the different arenas of political conflict that technocrats are forced to engage at each scale. I do not claim that territorial concerns are limited exclusively to the inter-state scale, and the nationalist concerns being limited to the intra-state scale. The fact remains, however, that conflict

at the inter-state scale is more likely to involve clashing claims to exclusive sovereignty over territory, and thus more likely to lead to the militarization of territory. Conversely, at the intra-state scale where there exists a history of core-periphery tensions between the federating units of Pakistan as well as a unitary state apparatus of governance over a relatively well defined territory, political opposition takes the form of contests over nationalist ideology. By situating depoliticizing strategy in the context of state formation, I was able to push back against the dominant technocratic understanding that blames the politicization of water controversy on the unreformed and provincialized loyalties of engineers. Critical resource geographers examining processes of depoliticization and repoliticization in resource governance, then, may benefit from more focused analyses of the geographical aspects of state formation, such as securing territory and consolidating hegemonic nationalist ideology.

Examining the spatiality of expert authority reveals the presence of an imaginative geography of modernity in the politics of hydrocrats in the Indus Basin. In this imaginative geography, experts located in developed or rich countries have a level of rational objectivity with respect to water measurement. As the Indus Basin and Pakistan are located at the periphery of the world system, this suggests that the depoliticization strategies of invoking external expertise may be specific to the politics of state formation in the capitalist periphery. The underlying belief is that the data state can only be established in the capitalist periphery by overcoming the inherent and persistent politicization of the locally rooted engineer by invoking the ostensibly rational and objective expertise of the metropole. The appeal to external expertise signals a strong consciousness on the part of Pakistani engineers that modern people, those who could be counted on not to politicize water measurement, live elsewhere. Thus water engineers repeatedly called for supposedly

impartial external experts based in the capitalist core of the world system to resolve controversies at both scales (although this was a much more prominent strategy at the inter-state scale).

Comparative analysis of the invocation of external expertise helps us theorize state formation and environmental modernization across historical-geographical conjunctures and between different positions within the world-system (Akhter 2015a; Swyngedouw 2015).

Conclusion

The depoliticizing strategies and practices of the hydrocracy in the Indus Basin can best be understood through a scale-sensitive analysis of state formation. At both the interstate and intrastate scales, I argue, hydrocrats approached controversies around water measurement by invoking the authority of external experts and/or technology. Indus hydrocrats invoke external expertise because of their perception that the process of politicization and repoliticization of water resources is rooted in the insufficiently modernized water managers and users. But data presented in this paper suggests that politicization was more firmly rooted in processes of territorialization at the interstate scale and the consolidation of a nationalist ideology at the intrastate scale. This finding has compelling implications for the theoretical development and the setting of research agendas in critical resources geography. First, there is much to be gained by understanding engineers and other resource experts in their role as agents of depoliticization. Second, paying attention to scale-dependency and inter-scalar processes can add valuable nuance to how we understand the spatiality of expertise. Finally, the notion of a technocratic “desire for the data state” suggests a useful starting point for the examination of how resource expertise and state formation interact in a variety of specific scalar, historical, and geographic contexts. These

are possible openings to develop concepts and theories that aim to explain historical and ongoing political ecologies of state formation.

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